Elements and periodic table

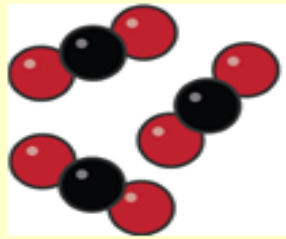
- There are 118 different elements. Each element is made up of a different type of atom.

-Elements are arranged into the periodic table based on their number of protons.

-The group number tells you how many electrons are in the outer shell

-The period number tells you how many electron shells the atom will have

Compounds

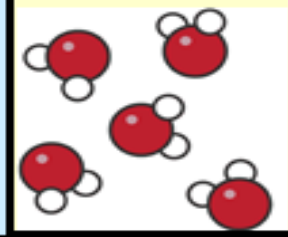


-pure substances that are made from more than one element chemically bonded together.

-Compounds have a fixed ratio of elements bonded together.

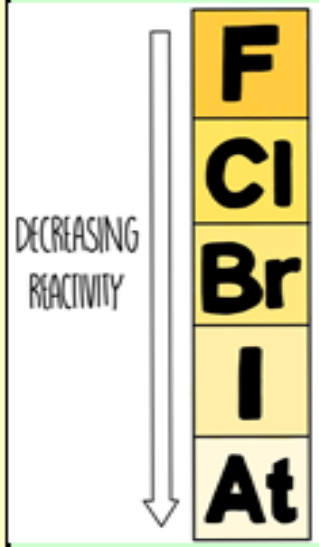
-They can be represented using formula

E.g. H_2O (water), CO_2 (carbon dioxide), CH_4 (methane)



To break apart compounds you need to do a chemical reaction e.g. electrolysis, thermal decomposition

Group 7 (Halogens)



-react with metals to produce a salt

-chlorine is used for sterilizing water

-bromine is used for making pesticides and plastics

-iodine is used for sterilizing wounds

Group 0 (Noble gases)

-have full outer shells of electrons

-very unreactive

-tend to give off light when an electric current is passed through.

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Year 7 Elements compounds and reactions

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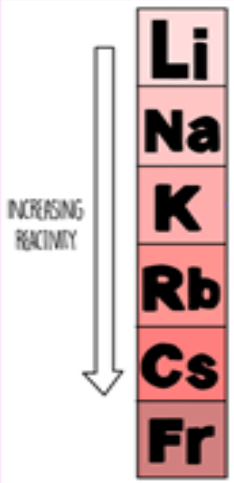
Group 1



-Known as the alkali metals

-react with water to produce an alkaline solution

$M + H_2O \rightarrow MOH + H_2$

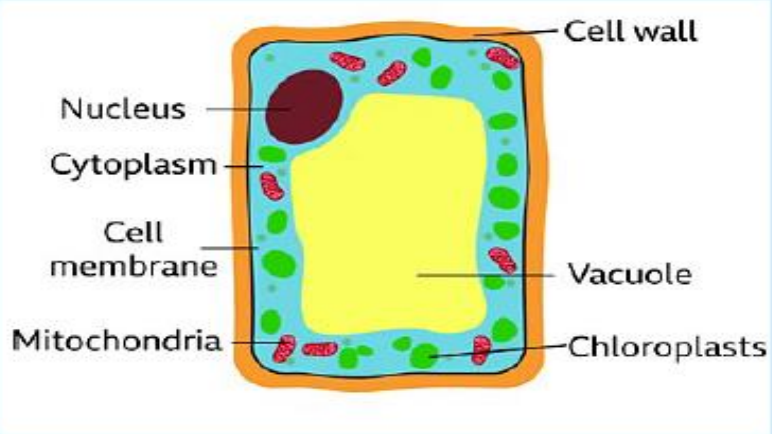
Combustion

Combustion another name - burning.

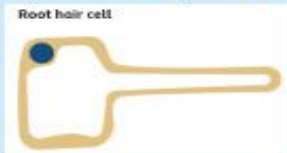
During a combustion reaction a fuel is reacted with oxygen o release carbon dioxide gas and water

Combustion is an example of an OXIDATION reaction. Oxidation is where oxygen reacts with a substance

Plant cells



Specalised plant cell

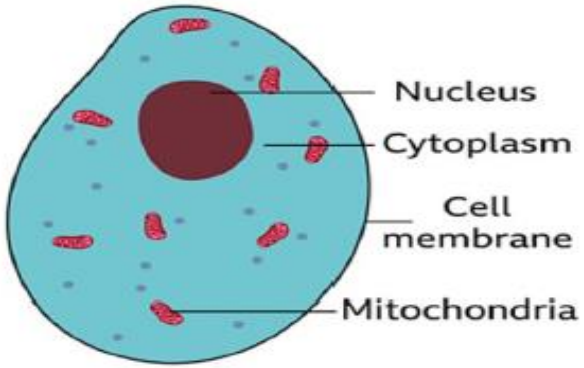


ROOT HAIR CELL

-Large surface area

- thin membrane

Animal cells



Specalised animal cell

RED BLOOD CELL

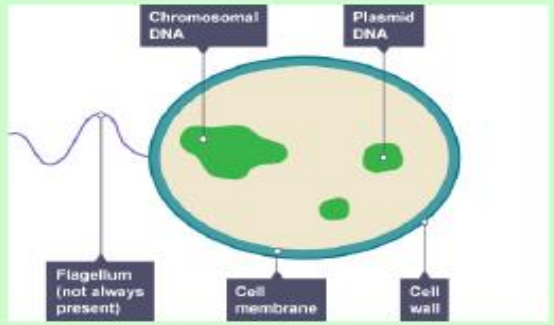
-no nucleus

-large surface area

Unicellular organisms

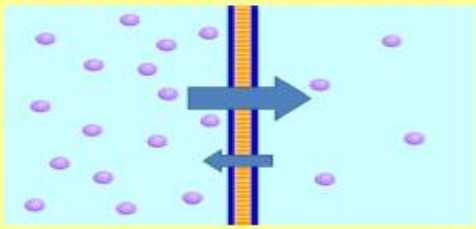
Living things that are just one cell.

e.g. Bacteria



Other examples include fungus, amoeba and euglena

Movement in and out of cells



Substances pass across a membrane from an area of high concentration to an area of lower concentration until equilibrium is met.

Osmosis is the diffusion of **water** molecules from an area of high water concentration to low water concentration across a partially permeable membrane

Year 7 Cells

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Multicellular organisms

Organized into increasingly complex parts

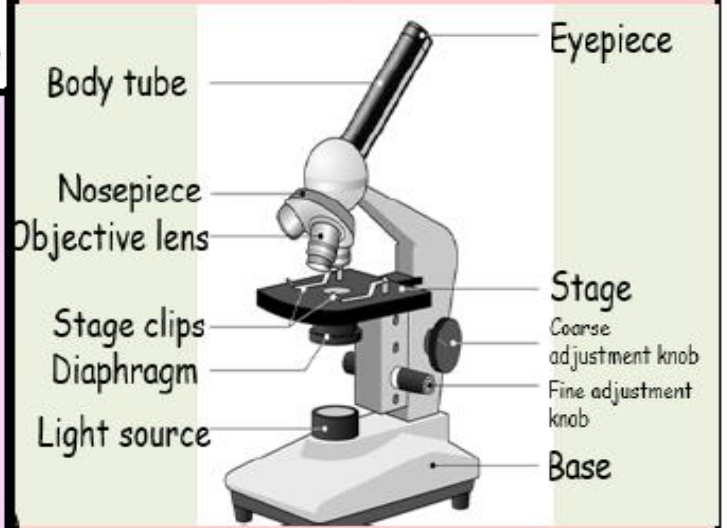
Cells, tissues, organs and organ systems

TISSUES- Made from a group of cells with a similar structure—Muscle, lining of lungs, Xylem

ORGANS- Made from a group of different tissues—heart, lung, stomach

ORGAN SYSTEMS- Made from a group of different organs working together—circulatory system , respiratory system.

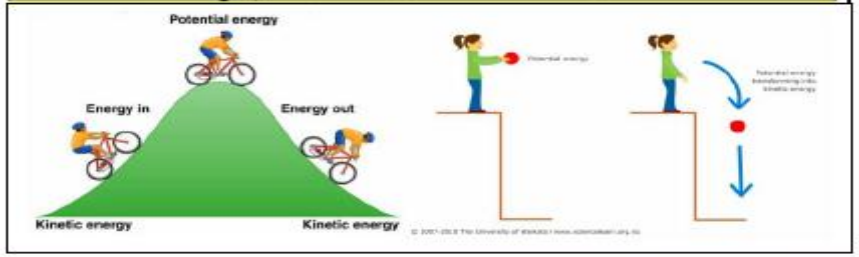
Microscopes



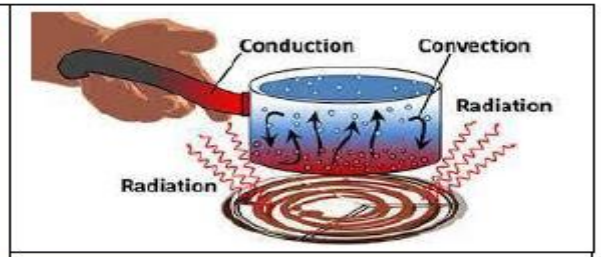
Year 7 Knowledge Organiser - Energy

The Deanery CE ACADEMY

Keyword	Definition
Energy Transfer	Changes from one form of energy to another form of energy.
Conservation of Energy	Energy cannot be created or destroyed It can be stored, dissipated or transferred from one form into another.
Internal Energy	Energy stored in all materials, including energy due to the motion of particles and the forces between them.
Kinetic Energy	Energy which an object possesses by being in motion.
Elastic Potential Energy	Energy stored in squashed, stretched or twisted materials.
Gravitational Potential Energy	The energy stored by an object lifted up against the force of gravity. Also known as GPE.
Thermal Energy Store	Energy store filled when an object is warmed up.
Work done	Work is done when a force makes an object move a distance, energy is transferred
Power	The rate of work done. Or The energy transferred per second.
Fossil Fuel	Natural, finite fuel formed from the remains of living organisms, e.g. oil, coal and natural gas.
Non-Renewable	A resource that cannot be replaced when it is used up, such as natural gas or cold.
Renewable	An energy resource that will not run out, e.g. solar energy and wind energy

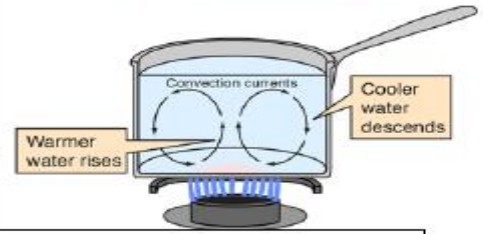


Type of energy	Description	Type of energy	Description
Kinetic	The energy in moving objects	Thermal (Internal)	The heat stored in an object
Chemical	When a substance undergoes a chemical reaction	Gravitational potential	When an object is raised to a height
Magnetic	When 2 objects attract or repel	Electrostatic (electrical)	Allo... curr...
Elastic potential	When an object is stretched or squashed	Nuclear	Energy stored in an atom *(not needed till GCSE)*
Light	*From a bright object (not stored)*	*Sound*	*From a vibrating object (not stored)*

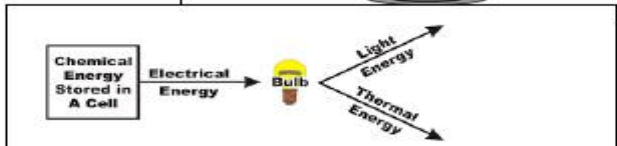


Table

Description automatically generated

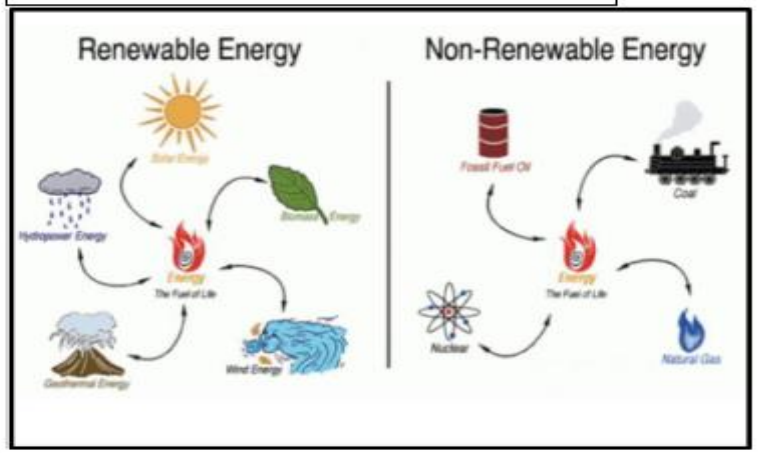


Idea it is explaining	Money as a model	How the model links to energy
Energy's ability to be stored	We store our money in pockets, purses and bank accounts.	Energy is stored. For example, energy is stored in the kinetic energy store in objects that move.
Energy can be transferred	When we pay for an item in a shop we are transferring our money from one store (pocket, purse or wallet) to another (the till).	Energy can be transferred between different stores.
The unit of energy	In the United Kingdom, money is measured in pounds sterling (£).	Energy is measured in **joules** (J).



Energy transfers

- **mechanically**– when a force is applied to move an object through a distance
- **electrically**– when charge flows (electricity)
- **heating** – when heat energy is transferred
- **radiation** – when energy is transferred as a wave, for example as light or sound



Year 7 Forces

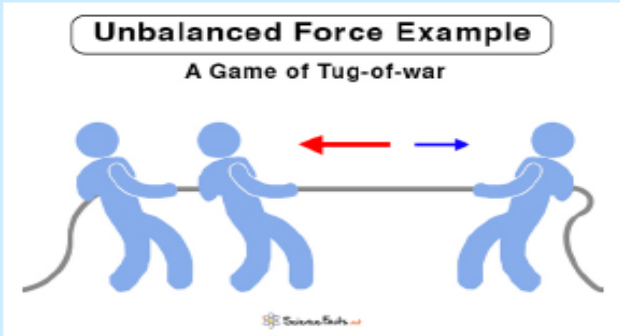
Forces

A force is a push or pull on an object which comes from an objects interaction with another object.

Forces can be shown by using arrows

Forces are measured in **Newtons (N)**

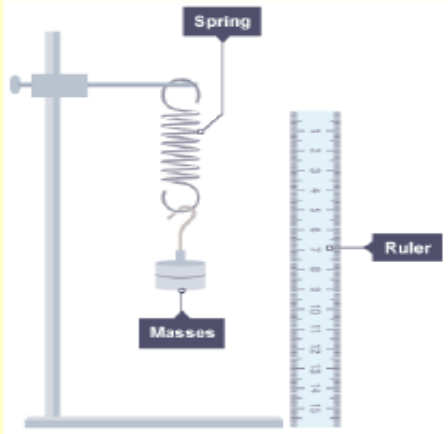
Unbalanced forces cause a change in motion or a change in shape

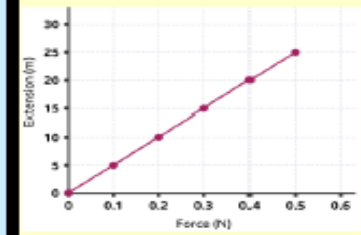


Hooke's Law

When you apply a force to a material it can extend. The extension is the length it has increased by

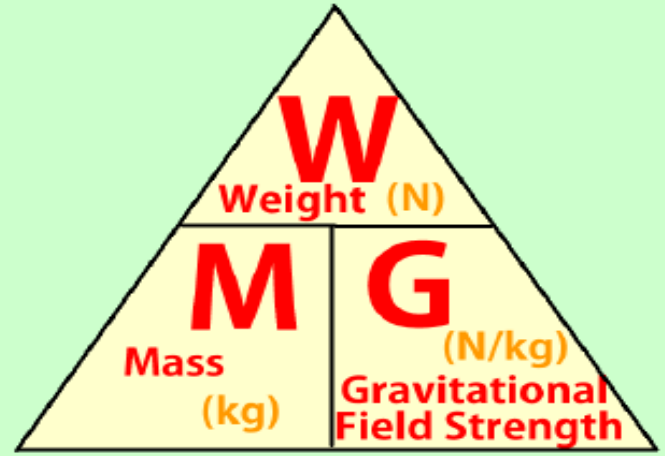
The amount of force is proportional to the stretch



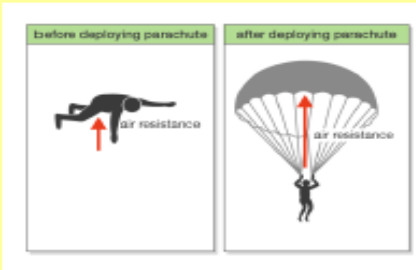


In a force extension graph- The steeper the line, the stiffer the spring

Weight and Mass



Air and Water Resistance



Air resistance is a type of friction between air and another material

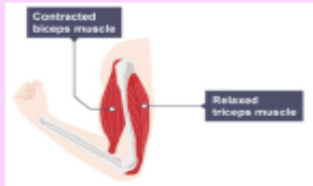
Increasing speed causes an increase in air resistance until the forces become balanced at which point you have reached **TERMINAL VALOCITY**

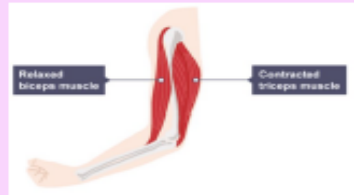
STREAMLINING reduces air and water resistance

Forces by muscles

The forces excerted by muscles are a type of force called a **moment**

Muscles can only pull. They move joints by working as antagonistic muscle pairs.





Gravity

Is a force that attracts objects towards each other. The bigger the mass the stronger the gravity. The gravitational pull of the earth pills objects

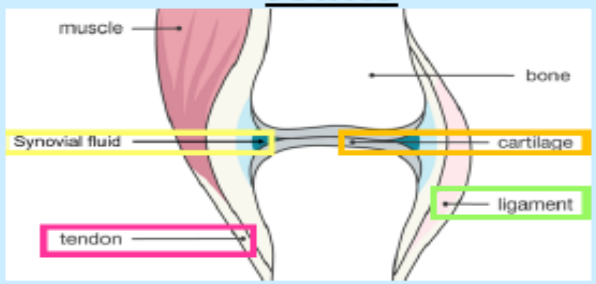
towards the centre of the earth.

Units for gravity are :

N/kg

Year 7 Organ Systems

Joints



Cartilage— Prevents bone damage from friction

Ligament— Connects bone to bone for movement

Tendon— Connects bone to muscle for movement

Synovial fluid— Lubricant to reduce friction in joints

Muscles

Muscles allow for movement which is necessary for all organs to function, from bones to intestines.

Skeleton

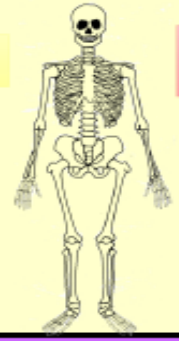
Four key Functions:

Support- so that we can stand up

Movement- muscles attach to the bones

Protection- vital organs are not damaged

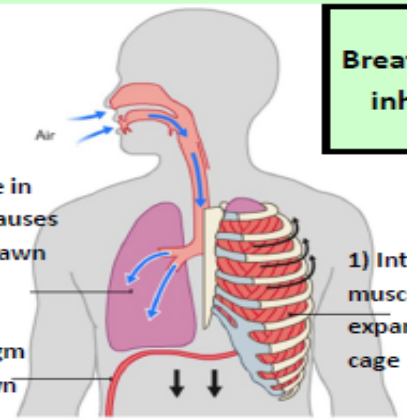
Making blood cells- to carry oxygen and fight disease



Breathing

Breathing is the physical process of changing pressure to draw air into the lungs. **Respiration** is a chemical reaction which uses oxygen to release the energy stored in food.

Breathing in— inhalation



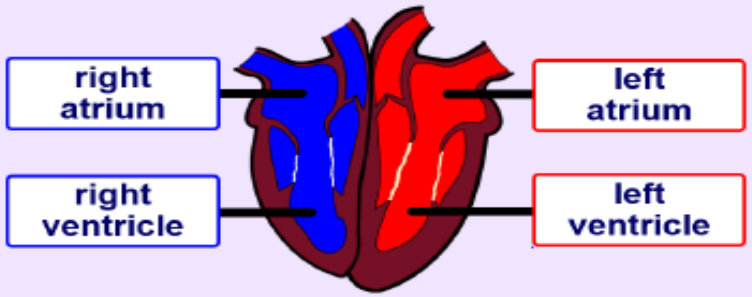
3) Decrease in pressure causes air to be drawn into lungs

2) Diaphragm moves down

1) Intercostal muscles contract, expanding rib cage

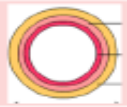
The Heart

The function of the heart is to pump blood around the body. Humans have a double circulatory system, this means the heart is divided in half. The left side of the heart pumps blood to the body, the right side pumps blood to the lungs.



Blood passes through the lungs to obtain oxygen needed for respiration and to remove carbon dioxide (a waste product from respiration).

Blood Vessels

Blood Vessels	Artery	Vein	Capillary
Diagram			
Function	Transports blood **A**way from the heart	Transport blood to the heart	Connects arteries to veins
Blood pressure is	High pressure in pulses	Low pressure	Low pressure
Adaptations	Thick muscular and elastic walls to resist the high pressure	Large lumen and valves to try and keep the blood moving in one direction	Thin, permeable walls that allow substances to be transferred between the blood and the tissues

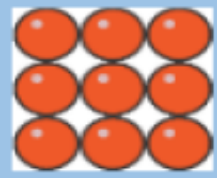
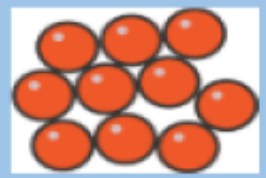
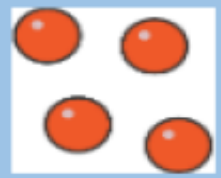
Year 7 Particles

Forces between particles:

Solid: There are strong forces of attraction between the particles in a solid. Therefore, particles can only vibrate in a fixed position.

Liquid: There are weaker forces of attraction between the particles in a liquid. Therefore, the particles are close together, and are able to move around each other.

Gas: The forces of attraction between the particles are overcome. Therefore, the particles are far apart and move quickly in all directions.

Solid	Liquid	Gas
		
The particles vibrate in a fixed position.	The particles are close together and move around each other.	The particles are far apart and move quickly in all directions.
The particles cannot move from place to place.	The particles are arranged in a random position.	The particles are arranged in a random way.
Particles have a fixed shape and cannot flow.	The particles flow and take the shape of the bottom of their container.	The particles flow and completely fill their container.
The particles cannot be compressed (squashed)	The particles cannot be compressed.	The particles can easily be compressed.

Keyword	Definition
Particle	The general term for a small piece of matter.
State of Matter	The distinct forms in which matter can exist (solid, liquid, gas)
Solid	A substance with a fixed shape and volume.
Liquid	A substance with a fixed volume but not a fixed shape.
Gas	A substance that does not have a fixed shape or volume.
Change of State	The change of a substance from one physical form to another.
Melting	The change of state when a solid changes to a liquid.
Freezing	The change of state when a liquid changes to a solid.
Condensing	The change of state when a gas changes to a liquid.
Evaporation	The change of state when a liquid changes to a gas.
Density	The amount of mass that 1cm³ of a substance has.
Density (formula)	Density = mass ÷ volume ρ = m ÷ v
Dense	Something which is heavy for its volume.

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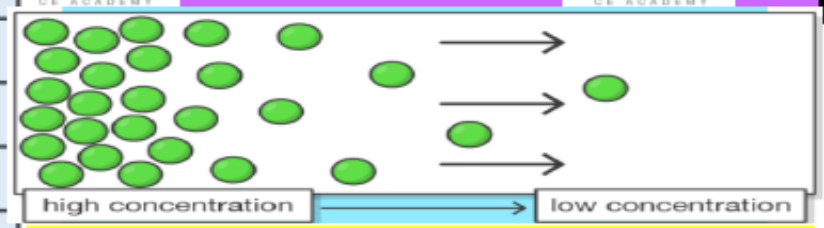
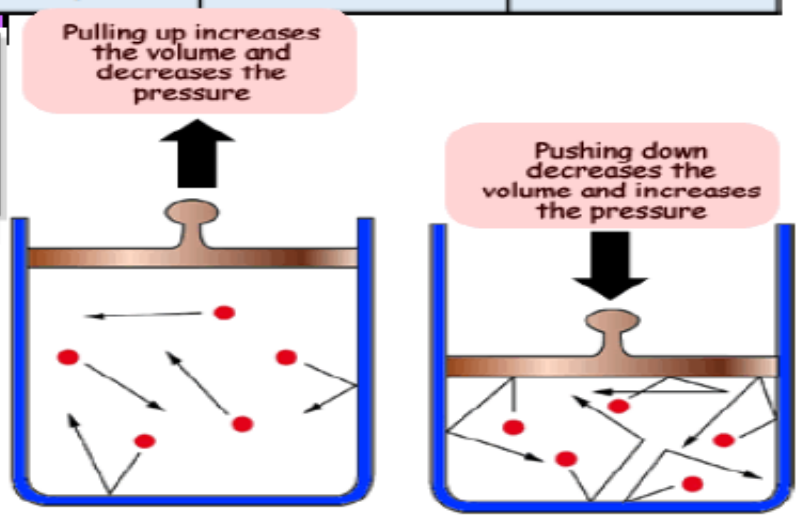


Further Reading:

https://www.bbc.com/bitesize/guides/z2wmxnb/revision/1

https://www.bbc.com/bitesize/articles/zqpv7p3



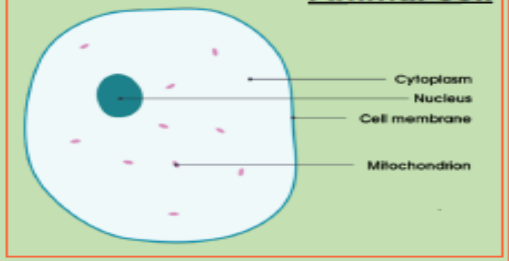
In the smaller space the particles suffer more collisions with the walls of the container - it is this that we measure as 'pressure exerted by the gas'.

Year 7 – Knowledge Organiser – Biology B1, B2 & B3

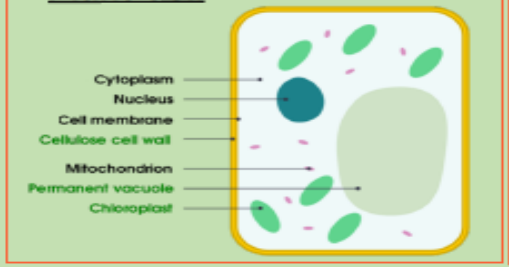
B1 – Cells Key Words

Sub-cellular structure	Function
Nucleus	Contains genetic information (DNA). Plural is nuclei.
Cytoplasm	Jelly like substance, where chemical reactions occur.
Mitochondrion	Where **aerobic respiration** occurs. This releases energy for the cell. Plural is mitochondria.
Cell membrane	Controls what can get in and out of cell.
Chloroplast	Contains chlorophyll, which absorbs light energy for **photosynthesis**
Vacuole	Contains a watery liquid (sap) and is used for storage.
Cell wall	Provides rigid, strong outer part of cell, made of **cellulose**.

Animal cell



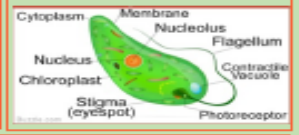
Plant Cell



Unicellular organisms

Unicellular organisms are living things that are only a single cell. They include euglena, protists, yeasts and bacteria.

Some unicellular organisms can be hard to classify (like euglena below) because they have characteristics of both pant and animal cells.



Specialised Cell

Specialised cells have all of the features of a normal plant or animal cell (membrane, nucleus, cytoplasm and mitochondria) but they are adapted for a certain function

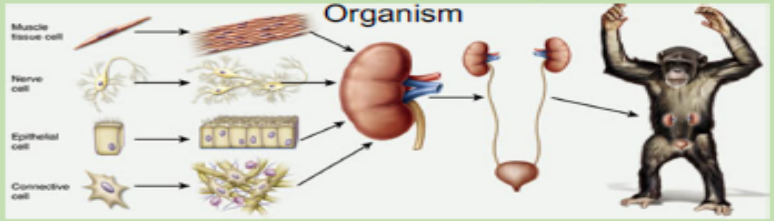
For example, a **red blood cell** is well adapted to carry oxygen because:
- It contains haemoglobin to bind oxygen.
- It has no nucleus to allow more space for haemoglobin
- It has a 'biconcave' shape to increase surface area for better

B2 – Organisation Key words

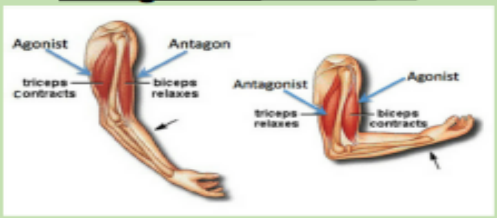
Word	Meaning
Cell	The basic unit (building block) of an organism.
Tissue	A group of specialised cells working together
Organ	Different tissue types working together to carry out a function. For **example, the heart** pumps blood
Organ system	Many organs working together to provide a vital function
Organism	A living thing. For **example, an oak tree or a camel.**
Hierarchy	Levels of organisation

Hierarchy

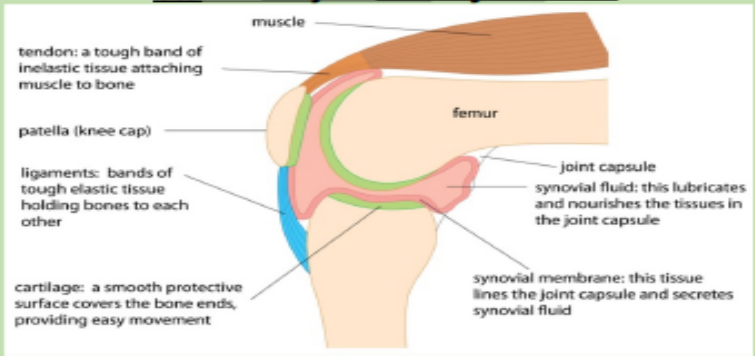
Cells → Tissues → Organs → Organ system → Organism



Antagonistic muscles



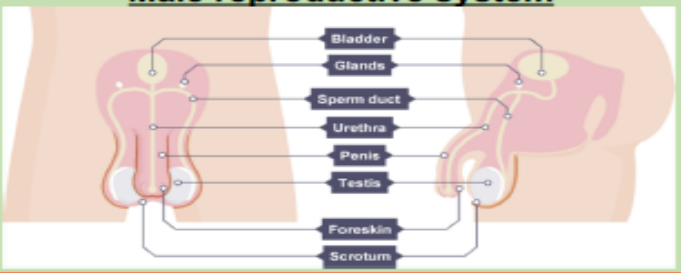
The knee joint – Key tissues



B3 – Reproduction Key Words

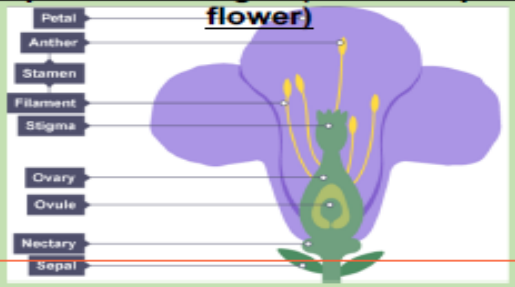
Key words	Meaning
Adolescence	The period of time where you change from child to adult. Physical and emotional changes happen
Puberty	Just the physical changes that happen during adolescence. For example, growing more body hair.
Gamete	Reproductive cells. For example, sperm and eggs.
Fertilisation	When the nuclei of two gametes fuse (join together)
Menstrual cycle	Monthly cycle in woman, where the uterus lining thickens, ready for pregnancy, then is released if an egg is not fertilised (period)
Pollination	Transfer of pollen from anther to stigma. Can be done by insect or wind.
Seed dispersal	How seeds are spread away from the plant that made them

Male reproductive system



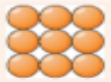
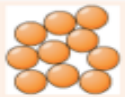
Female reproductive system

Plant reproductive organ (an insect pollinated flower)



Year 7 – The Knowledge Organiser – Chemistry 1,2,3

1. The Particle Model

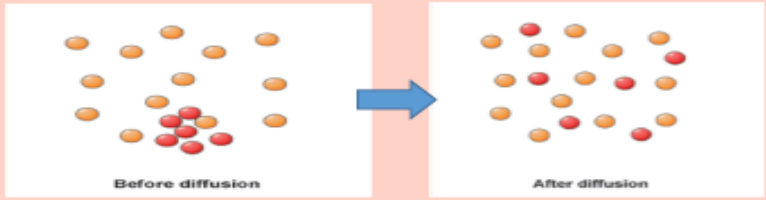
	Solid	Liquid	Gas
Arrangement of particles	Close together Regular pattern	Close together Random arrangement	Far apart Random arrangement
Movement of particles	Vibrate on the spot	Move around each other	Move quickly in all directions
Diagram			
Bonds	Strong	Weak	No bonds

2. Changing State

Keyword	Change of state	Particles
Freezing	Liquid to solid	Lose energy, only vibrate on the spot. Bonds form
Melting	Solid to liquid	Get more energy, move faster. Bonds begin to break. Particles move out of regular pattern
Evaporating	Liquid to gas	Get more energy, move faster. Bonds begin to break
Condensing	Gas to liquid	Lose energy, move slower. Bonds begin to form

3. Diffusion

Diffusion is the spreading out of particles

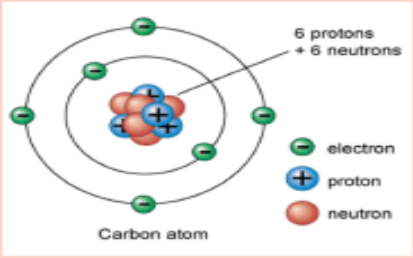


When chemicals, like the smell of perfume or burning toast, are let loose in a room, the particles mix with the air particles.
Gas: Diffusion is very quick in gases as the particles in a gas move quickly
Liquid: Diffusion can happen in liquids but slower, this is because the particles in liquids can move around each other
Solid: Diffusion can **not** happen in solids as the particles cannot move, they only vibrate on the spot

Key words

(a) **Melting point:** the temperature at which a material changes from a solid to a liquid (melts). The melting point of water is 0 degrees.
(b) **Boiling point:** the temperature at which a material changes from a liquid to a gas (boils). The boiling point of water is 100 degrees.

1. The Atom



Particle	Charge	Mass
Proton	+1	1
Neutron	0	1
Electron	-1	1/2000

$^{23}_{11}Na$

11 Protons
11 electrons
12 Neutrons

 Atoms - Singular

 Molecules - Bonded

2. Group 1: The Alkali Metals

- They have low melting and boiling points compared to other metals
- They are soft and can be cut with a knife
- They float on water
- They react with water, producing hydrogen gas
- They turn the water alkali after they react with water
- Reactivity **increases** as you go **down** the group

3. Group 7: The Halogens

Element	State	Appearance
Florine	Gas	Yellow gas
Chlorine	Gas	Pale green gas
Bromine	Liquid	Orange liquid
Iodine	Solid	Grey

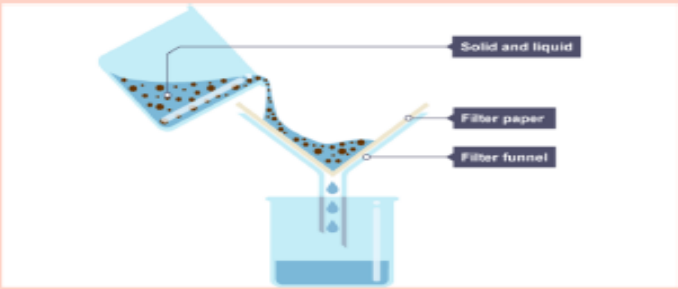
- Reactivity increases down the group
- Melting point increases down the group
- Boiling point increases down the group

Key words

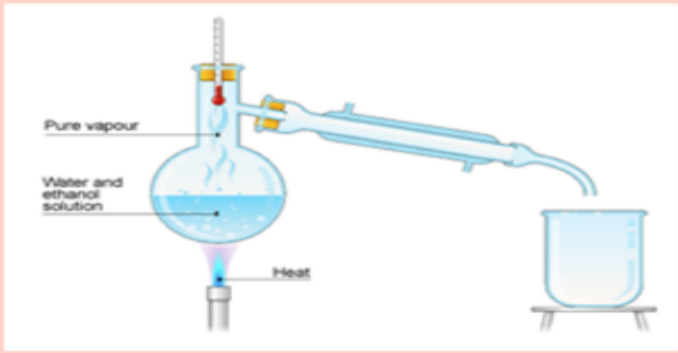
(a) **Atom:** the smallest building block of all things
(b) **Molecule:** two or more atoms that are **bonded** together
(c) **Element:** a substance made with only one **type** of atom
(d) **Atomic number:** number of protons in an atom
(e) **Mass number:** number of protons and neutrons in the nucleus
(f) **Group:** the column in the periodic table
(g) **Period:** the row in the periodic table

1. Separation Techniques

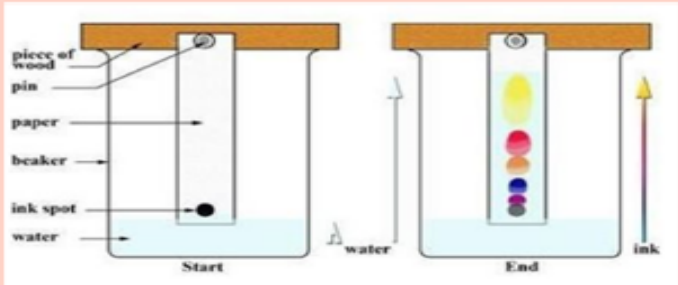
(a) Filtration – separates insoluble solids and liquids



(b) Distillation – separates two liquids



(c) Chromatography – separates coloured mixtures



Key words

(a) **Compound:** two or more substance together that **are** chemically bonded
(b) **Mixture:** two or more substance together that are **not** chemically bonded

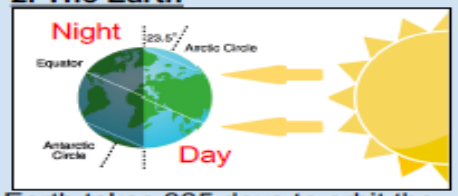
Year 7 – The Knowledge Organiser – Physics 1,2,3

1. The Solar System

Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune, (Pluto)

My Very Easy Method Just Speeds Up Naming (Planets)

2. The Earth



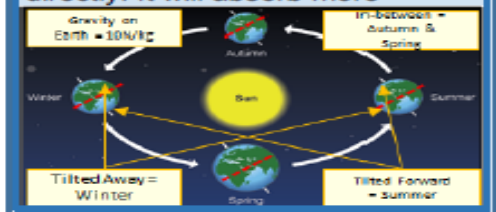
Earth takes 365 days to orbit the sun

Day and night are caused by the Earth spinning on its axis. It takes 24 hours to rotate once.

3. Seasons

The Earth is tilted at an angle of 23.5°

Summer will occur when part of the Earth is facing the sun more directly. It will absorb more

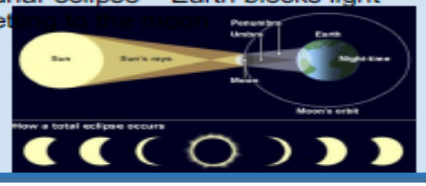


4. Phases of the moon

5. Eclipses

Solar eclipse = Moon blocks light from sun

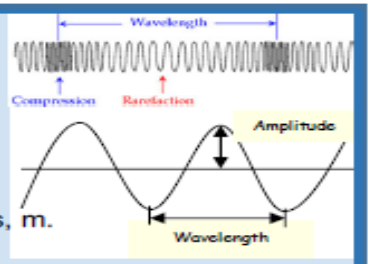
Lunar eclipse = Earth blocks light get[illegible] the moon



1. Waves

Longitudinal – Vibrations are along the same direction as the direction of travel

Transverse – The vibrations are at right angles to the direction of travel



2. Wave properties

a) **Wavelength** – The distance between two similar points on a wave. Measured in meters, m.

b) **Frequency** – The number of waves passing a point per second. Measured in Hertz, Hz.

c) **Wave speed** – The speed of the wave. Measured in m/s

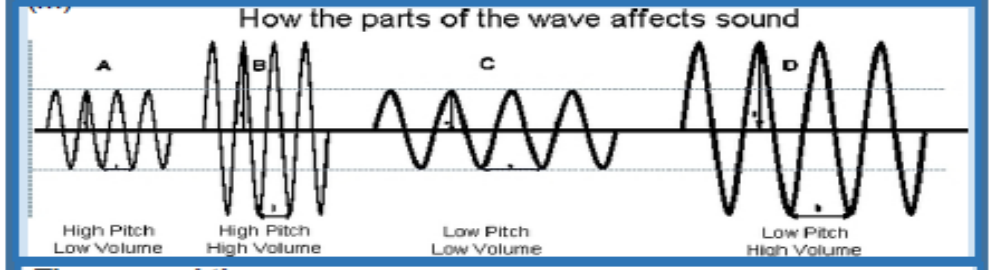
d) **Amplitude** – The distance from the middle to the top of a wave. Measured in meters, m.

3. The Wave Equation

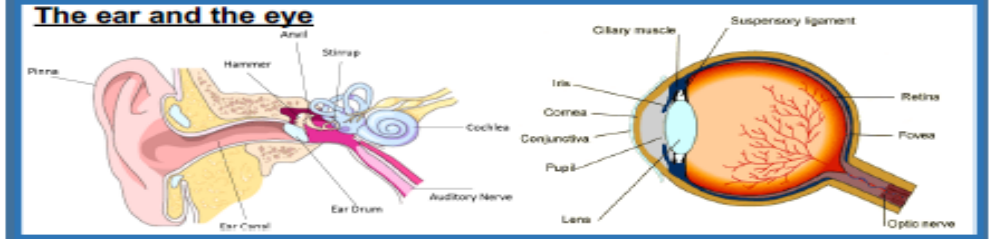
wave speed = frequency x wavelength

(m/s) (Hz) (m)

$$v = f \lambda$$



The ear and the eye

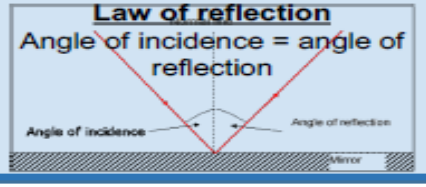


Reflection

Incident ray – Light hitting the surface

Reflected ray – Light bouncing off surface

The Normal – a line 90° to the surface



Refraction

When a wave enters a different material, it will change speed and therefore change direction

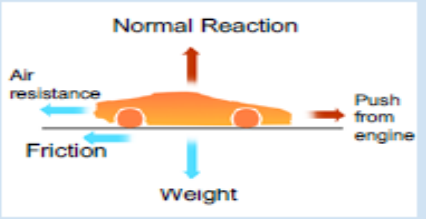
Slows down – moves towards normal

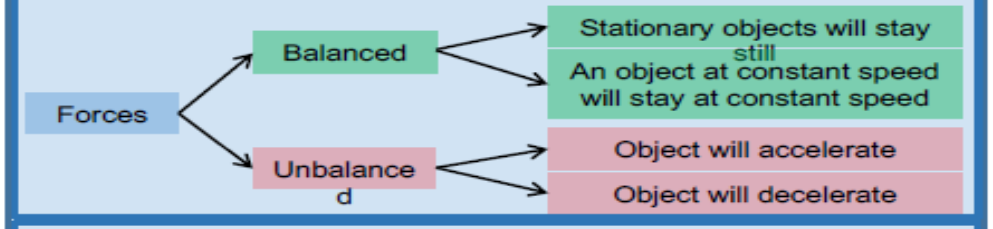
Speeds up – moves away from normal

1. Forces

Contact force – between two objects that are touching – e.g. friction, normal reaction force, air resistance

Non-contact force – between two objects that are not touching – eg weight, magnetic force





2. Newton's 2nd law

Force = mass x acceleration

(N) (kg) (m/s²)

$$F = m a$$

3. Rules for drawing forces

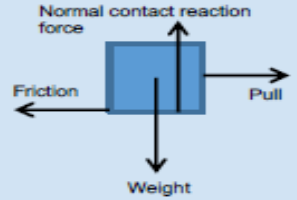
a) Arrows must be straight and drawn with a ruler

b) The size of the arrow must represent the size of the force

c) The weight must be drawn from the middle of the object

d) The friction and air resistance must touch the back of the object

e) The normal contact reaction force must start from where it touches



4. Weight, mass and gravity

Mass – The amount of matter in an object. Measured in kg.

Weight – The force due to gravity. Measured in Newton's, N.

Gravity – Pulls all objects towards each other

Weight = mass x g

(N) (kg) (N/kg)

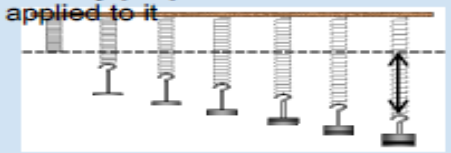
On Earth, g = 10

5. Hooke's Law

Force = Spring constant x extension

(N) (N/m) (m)

The extension of a spring is **directly proportional** to the force applied to it

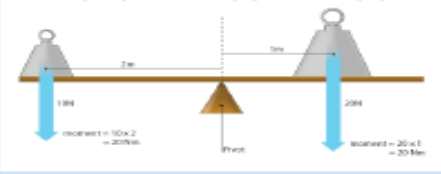


Remember its extension, not length

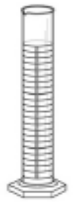
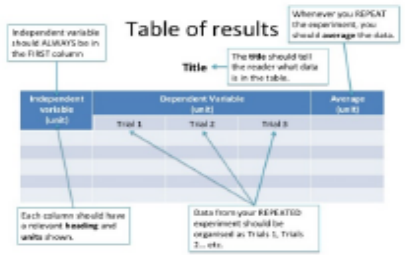
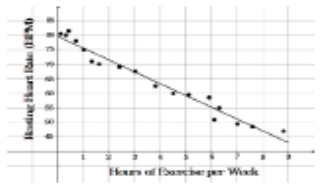
6. Moments

Moment = Force x distance

(Nm) (N) (m)



How Science Works

Equipment	Hazards and precautions	Planning	Results	Conclusion and Evaluation
To identify key pieces of equipment used in science.	To identify hazards and describe how to reduce risks.	To be able to describe how to carry out an investigation, using scientific vocabulary.	To be able to collate and present data in tables and graphs.	To be able to describe and explain patterns and trends in results, and ways that an investigation can be improved.
 Bunsen burner   Measuring cylinder	• Hair tied back • Ties tucked in • Wear safety goggles • Stools under desks to avoid trip hazards • Mop up any spillages • When lighting a Bunsen Burner have hand in front and carry spill at 45° upwards. 	**Independent Variable:** is the variable for which values are changed or selected by the investigator. **Dependent Variable:** is the variable of which the value is measured for each and every change in the independent variable. **Control Variables:** is one which may, in addition to the independent variable, affect the outcome of the investigation and therefore has to be kept constant. **Accuracy:** A measurement result is considered accurate if it is judged to be close to the true value. **Reproducible:** A measurement is reproducible if the investigation is repeated by another person, or by using different equipment or techniques, and the same results are obtained.	An example of a results table is shown below.  An example graph is shown below. It should feature: • Labels on both axis • Unit on each axis • A line of best fit (where possible) 	Key features of a conclusion: • Is there a trend/pattern in the results? If so, what is it? • Include sample results to support your conclusion. • Where there any anomalous results (ones that did not fit the pattern)? If so, can you give a possible reason for this? Key features of an evaluation: • Whether repeating the experiment would have made the results more reliable. • Whether any of the equipment broke or faltered. • Whether it too long to complete the experiment. • Whether you correctly completed every step.